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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,323	10/17/2005	Dirk Sampers	SAMP3001/JEK	9061
23364 7590 05/22/2007 BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			EXAMINER MUROMOTO JR, ROBERT H	
			ART UNIT 3765	PAPER NUMBER
			MAIL DATE 05/22/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/553,323

Applicant(s)

SAMPERS, DIRK

Examiner

Robert H. Muromoto, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Priority*

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8, and 18 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Payette, **The Virtual Shaft Control Algorithm for Synchronized Motion Control**, June 1998, Proceedings of the American Control Conference.

Payette discloses, "Synchronized motion control is a requirement in most machines used to manufacture paper, sheet metal, textiles and other products made from a flexible web of material. These machines typically have many rolls which need to be synchronized in order to control the position, velocity, and tension of the web (pg 1)."

"A successful synchronized motion control scheme must control both the spacial and temporal aspects of the motion. In this sense, synchronization refers to controlling the positions and velocities of the axes relative to each other so that they remain well-coordinated. For this paper, the Relative Stiffness topology will be referred to as the ***Virtual Shaft*** topology because it mimics the properties of a ***physical shaft***. (pg.1)"

The "axes" correspond to 'first' and 'second' drive motors.

"Using a form of torque feedback (*rotational course adjustment*), the Virtual Shaft (VS) topology mimics the stiffness and damping of a physical shaft. For example, the torque on a shaft is proportional to the angular displacement of the ends. This is Hooke's Law for shafts in torsion with the constant of proportionality being the stiffness of the shaft. In addition, damping in the shaft provides torque proportional to the **angular** velocity difference between the ends of the shaft, although the damping quality of most metals is typically very small compared to their stiffness. Likewise, **the VS algorithm computes restoring torque values based on the relative position and velocity between each axis and feeds them back to the current loop of the appropriate axis.** This is possible because torque and current are really the same state in a DC motor, and it is also true for an AC motor controlled with an ideal vector mode controller (pg.1-pg.2)."

"In the 2-axis system shown in Fig. 2, the speed and position feedback is measured for both axes. The controller computes the restoring torque by Eq. 1, where ***br*** is the damping gain, ***Kr*** is the stiffness gain, and ***Kir*** is the integrated stiffness gain. The integrated stiffness gain, ***Kir***, has no physical analogue; however, it is very useful because it allows the two axes to maintain zero relative displacement with a non-zero load torque. **The actual restoring torque for both axes is then supplied by their motors.** Thus, the ***VS controller attempts to force both axes to match in velocity and position like a real shaft.*** Of course, changing the stiffness and

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damping in the software to get the desired dynamics is much easier than redesigning and installing new shafts, couplings, and gearboxes (pg. 2)."

This 'computing' performs the recited "synchronizing" as recited in claims 1-5

Payette states, "the fundamental difference between the Virtual shaft and prior synchronization systems is that the V.S. algorithm attempts to minimize the relative errors between the axes while the prior art system attempts to minimize errors with respect to the reference (main shaft)." This is exactly the same objective stated by applicant in instant specification.

"The VS control algorithm connects the axes with an **electronic, virtual shaft**. The system remains better synchronized during accelerations and disturbances. When one of the axes experiences an increased disturbance load or falls behind its reference, all the axes "feel" the effect of the disturbance through the torque feedback and slow down (switchable break, claim 19) with the affected axis. In addition, the coupled axes (through the torque feedback) effectively "filter" the master reference (main shaft). The end result is that the slaves receive references which they are assured of being able to track. The benefit is better synchronization at the expense of not exactly following the master reference (main shaft). In many web handling applications, however, synchronization of the axes is more important than following the master reference absolutely (pg. 2)."

The VS controller corresponds to a "control and regulating unit" and is disclosed as an adjustable system that needs "tuning". Therefore it would inherently include an input system as claimed.

Payette concludes, "The **VS** controller emphasizes **synchronism** **between the axes at the expense of following the master reference (main shaft)** **absolutely**. In the web handling industry this means better tension control. It is also noteworthy to add that the VS controller does not require any additional hardware compared to the prior art controller as both controllers are **implemented in software** (program controller, claim 8)."

A "sensor" as recited in claim 18 is inherent to Payette. As Payette discloses that any disturbances are "felt" through the torque feedback.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10, 12-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Payette in view of instant Background of invention.

Although Payette has disclosed all limitations of the claims above as well as the overall intended inventive concept of the instant invention, Payette does not explicitly teach the specific elements of the loom to be "synchronized" as in claims 10 and 19.

However, applicant has admitted in the Background of Invention that it is known in the art to have separate drives for the batten and the shedding device and various other moving parts of the weaving loom. Payette clearly teaches a Virtual synchronization for all or any motors of a weaving loom.

Therefore it would have been obvious to one of ordinary skill in the art to have a batten of a loom driven by one motor and the shedding mechanism driven by another as this is widely known in the art of weaving as admitted by applicant.

With respect to the limitations in claims 12-17, gearing design and location without any unexpected results or criticality in regards to the final invention are considered to be obvious variations and design choices to known weaving machines that all use various gear designs for various purposes in the weaving machine (as evidence refer to US patent 6,707,267 that uses a drive system for each of the shedding device and batten all using a gear train that involves a common switching gear). One of ordinary skill in the art could have through routine experimentation determined the optimum gearing design and layout for a particular end use application.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Payette in view of instant Background of Invention as applied to claims above, and further in view of Moessinger US patent 4,392,515.

Although the combined teachings above teach essentially all of the limitations of the claimed invention they do not teach a first motor being resiliently coupled to a shedding mechanism.

However, '515 does teach the use of elastic couplings between loom parts to decrease effects of vibrations during weaving. Figure 5 shows an elastic element that couples the shedding device to the drive motor.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a resilient coupling between a shedding device and drive means to decrease the effects of vibration during weaving.

### ***Response to Arguments***

Applicant's arguments filed 3/5/2007 have been fully considered but they are not persuasive. Applicant argues that amendment added 3/5/2007 is not taught by the reference above. This is incorrect. The Payette article clearly teaches a virtual synchronization of the shafts at a given point as recited. Payette clearly discloses that the shafts are not in sync except at the desired points. Since this is the only argument present the rejection remains and is considered to be proper.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.




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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert H. Muromoto, Jr. whose telephone number is 571-272-4991. The examiner can normally be reached on 8-530, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Welch can be reached on 571-272-4996. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Bobby Muromoto  
Patent examiner  
5/16/2007



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